



## ORAL PRESENTATION

## Open Access

# Overestimation of infarct size following acute myocardial infarction is related to extent of myocardial edema

Ananth Kidambi\*, Akhlaque Uddin, David P Ripley, Adam K McDiarmid, Peter P Swoboda, Tarique A Musa, Bara Erhayiem, Gavin Bainbridge, John P Greenwood, Sven Plein

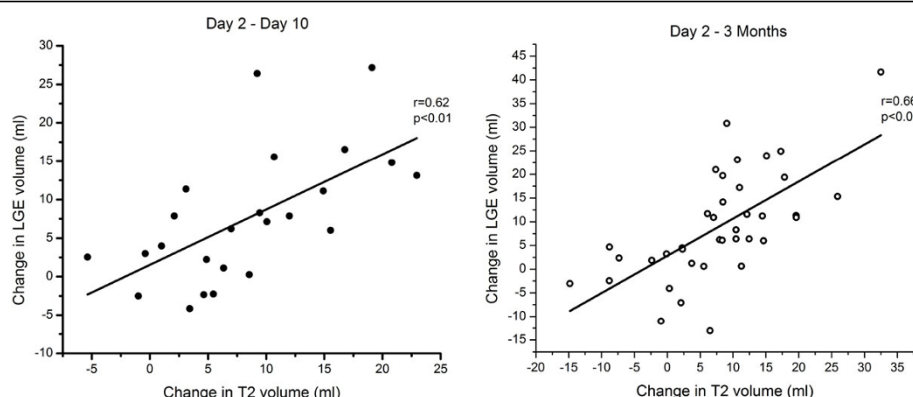
From 17th Annual SCMR Scientific Sessions  
New Orleans, LA, USA. 16-19 January 2014

## Background

Late gadolinium enhancement (LGE) is an accurate and reproducible method to delineate nonviable myocardium following myocardial infarction (MI). However, in the early stages following acute MI, LGE has been shown to overestimate the size of the infarct zone by up to 30%. The causes for this are unclear, and may be related to tissue remodelling, intracellular contrast uptake, or expansion of the interstitial space. Myocardial edema is a feature of reperfused acute MI, and edematous myocardium has been associated with early contrast enhancement [1]. We hypothesised that the presence of tissue edema is also related to late enhancement, and contributes to overestimation of infarct size in acute MI.

## Methods

46 patients received CMR examination at 3.0T at 2 days following reperfused ST-elevation acute MI, with follow-up imaging at 10 days and 3 months. Short-axis T2-weighted imaging and cine imaging were performed, as well as LGE imaging 16-20 minutes following administration of 0.1 mmol/kg gadolinium DTPA. Edema volume was measured on T2-weighted imaging and scar volume measured on LGE imaging, both quantified using a semi-automated histogram-based thresholding method (Otsu method). The change in scar volume was compared to the change in edema volume between day 2 and day 10, and between day 2 and 3 months.

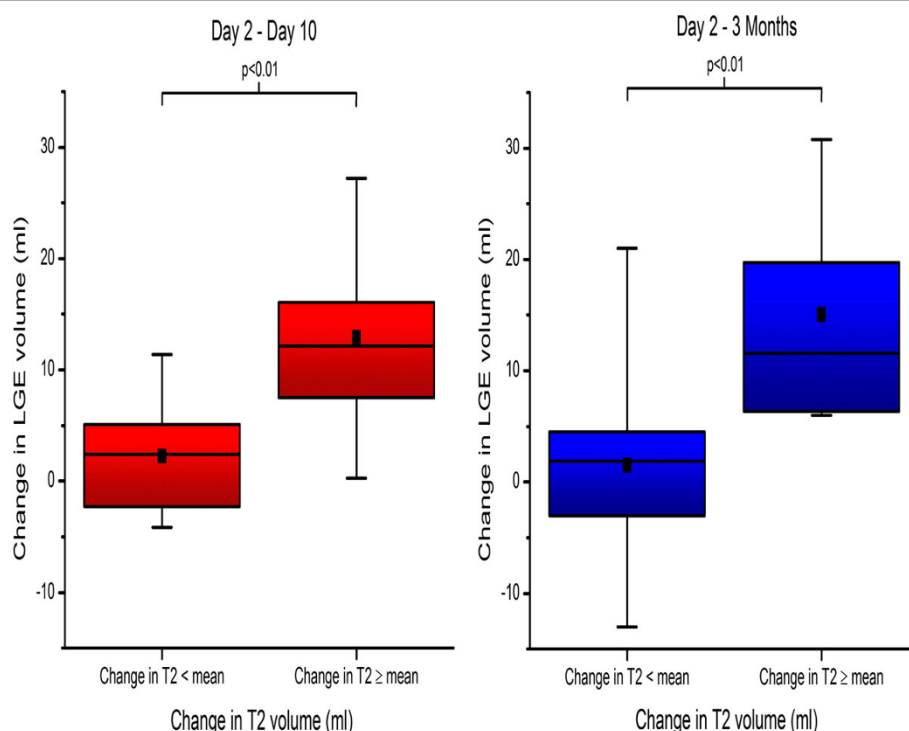


**Figure 1** Change in estimation of scar volume by LGE correlates with resolution of myocardial edema by day 10 (left panel) and 3 months (right panel).

Cardiology, Multidisciplinary Cardiovascular Research Centre & The Division of Cardiovascular and Diabetes Research, Leeds Institute of Genetics, Health & Therapeutics, University of Leeds, Leeds, UK



© 2014 Kidambi et al.; licensee BioMed Central Ltd. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated.



**Figure 2** Acute overestimation of scar volume is related to resolution of myocardial edema by day 10 (left panel) and 3 months (right panel).

## Results

Of the 46 patients studied, 27 (59%) completed imaging at day 10 and 39 (85%) at 3 months. Mean scar volume decreased by 7 ml (23%,  $p < 0.01$ ) at 10 days and 9 ml (28%,  $p < 0.01$ ) at 3 months. There was significant correlation between change in edema volume and change in scar volume from day 2 to day 10 ( $r = 0.62$ ,  $p < 0.01$ ) and day 2 to 3 months ( $r = 0.66$ ,  $p < 0.01$ ) (Figure 1). Stratifying patients into two groups based on mean change in edema volume, patients with more change in edema had significantly higher change in scar volume (Figure 2).

## Conclusions

LGE CMR overestimates scar volume acutely following acute reperfused MI. This overestimation correlates with the volume of myocardial edema detected acutely.

## Funding

JPG and SP receive a research grant from Philips Healthcare. SP is funded by British Heart Foundation fellowship (FS/10/62/28409).

## Reference

1. Matsumoto, et al: JACC Cardiovasc Imaging. 2011.

doi:10.1186/1532-429X-16-S1-O21

**Cite this article as:** Kidambi et al.: Overestimation of infarct size following acute myocardial infarction is related to extent of myocardial edema. *Journal of Cardiovascular Magnetic Resonance* 2014 **16**(Suppl 1):O21.

**Submit your next manuscript to BioMed Central and take full advantage of:**

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at  
www.biomedcentral.com/submit

